

## Supplemental Material

### Behavioral accuracy

**Experiment 1.** Target discrimination accuracy was 86.6% (SD=10.7%) in the structured location and 84.6% (SD=6.6%) in the random locations; these levels did not differ [ $t < 1$ ].

**Experiment 2.** Target discrimination accuracy was 89.7% (SD=11.5%) and 85.7% (SD=11.7%) for target and distractor singletons in the structured color, respectively, and 88.4% (SD=10.0%) and 84.3% (SD=9.8%) for target and distractor singletons in the random color, respectively. In a repeated-measures ANOVA, accuracy was higher for target vs. distractor singleton types [ $F(1,19)=6.08$ ,  $p=.02$ ,  $\eta_p^2=.24$ ], but there was no main effect of structured vs. random singleton color [ $F(1,19)=2.01$ ,  $p=.17$ ,  $\eta_p^2=.09$ ] and no interaction [ $F < 1$ ].

**Experiment 3.** Target discrimination accuracy in the Color Group was 91.3% (SD=6.4%) and 92.3% (SD=8.2%) for target and distractor color singletons, respectively, and 93.3% (SD=6.5%) and 89.0% (SD=7.4%) for target and distractor orientation singletons, respectively. Target discrimination accuracy in the Orientation Group was 94.3% (SD=5.6%) and 89.7% (SD=9.7%) for target and distractor orientation singletons, respectively, and 94.7% (SD=5.8%) and 89.0% (SD=10.2%) for target and distractor color singletons, respectively. In a mixed-effects ANOVA, accuracy was higher for target vs. distractor singleton types [ $F(1,28)=7.32$ ,  $p=.01$ ,  $\eta_p^2=.21$ ]. However, there was no three-way interaction between group, singleton dimension, and singleton type [ $F(1,28)=2.49$ ,  $p=.13$ ,  $\eta_p^2=.08$ ], nor did any other main effects or interactions reach significance [ $ps > .17$ ,  $\eta_p^2s < .06$ ].